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EXAMINER	
NOLAN, DANIEL A	

ART UNIT	PAPER NUMBER
2654	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/965,239	DROPPO ET AL	
	Examiner	Art Unit	
	Daniel A. Nolan	2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 September 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 15-32* is/are rejected.

7)☒ Claim(s) *14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 September 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *041011*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 09/27/2001 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:

- 195 (in figure 1) is not specified.
- 608 (in figure 6) is not specified.

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested:

"Including the Category of Environmental Noise when Processing Speech Signals".

Claim Objections

4. Claim 14 is objected to because of the following informalities:

- Claim 14 contains the adjective "some". It is suggested to use a more precise definition.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

El-Maleh *et al* [6/99]

6. Claims 1-2 and 19-20 are rejected under 35 U.S.C. 102(b) as being anticipated by El-Maleh *et al* [6/99] ("An Improved Background Noise Coding Mode For Variable Rate Speech Coders", Workshop on Speech Coding Proceedings, June 1999).

7. Regarding claims 1 and 19, the teaching by El-Maleh *et al* [6/99] that *classification of the noise type is used to select the type of excitation to be used at the receiver to reproduce background noise without an increase in bit rate* read on the features of the claim for *identifying a noise environment in which a noisy input signal was generated* with figure 1 on page 136, as follows:

- El-Maleh *et al* [6/99] read on the feature of claims 1 and 19 for *identifying frames of the noisy input signal* ("Feature Extraction" block in figure 1 – see lines 12-13 of the right column page 136);
- El-Maleh *et al* [6/99] read on the feature of claim 1 for *generating a noisy input feature vector for the signal in each frame* ("noise classification" block in figure 1 – see lines 1-6 of section 3 on page 136); *and*
- El-Maleh *et al* [6/99] read on the feature of claims 1 and 19 *for each frame, making a separate identification of a noise environment in which the noisy input feature vector*

for the current frame was generated based on the noisy input feature vector (ultimately →y(n) in figure 1 – see 11-12th lines from end of left column page 136).

- Regarding claims 2 and 20; the claims are set forth with the same limitations as claims 1 and 19. El-Maleh *et al* 6/99 read on the feature of *determining a probability of each of a set of environments based in part on the noisy input feature vector* (lines 12-15 in right column page 136 – where the incorporated seminal reference of El-Maleh *et al* 3/99 ("Frame Level Noise Classification In Mobile Environments", International Conference on Acoustics, Speech, and Signal Processing, March 1999) teach that to *modify processing according to the type of background noise requires noise classification done on a frame-by-frame basis,* with the further limitation of *probability* inherently taught (with supporting reference to Quinlan's C4.5 programs for the inductive process described in the last six lines of the left column before section 3 on the 2nd page of El-Maleh *et al* 3/99).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

El-Maleh *et al* [6/99] & Wynn ['394]

10. Claims 3-7 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over El-Maleh *et al* [6/99] in view of Wynn ['394] (U.S. Patent 5,706,394 A).

11. Regarding claims 3 and 21; the claims are set forth with the same limitations as claims 2 and 20, respectively. El-Maleh *et al* [3/99] is silent on the subject of *determining a filtered probability of an environment.* Wynn ['394], with the *telecommunications speech signal improvement by reduction of residual noise* invention, reads on the feature of *determining a filtered probability of an environment for a current frame* based *in part on the probability of the environment for at least one previous frame* (49-59).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Wynn ['394]

to the device/method of El-Maleh *et al* [6/99] to avoid abrupt or continuous changes in character and content of transmitted background noise.

12. Regarding claims 4 and 22, the claims are set forth with the same limitations as claims 3 and 21, respectively. El-Maleh *et al* [3/99] is silent on the subject of *determining an unfiltered probability of an environment.* Wynn'394 reads on the claims for *determining the filtered probability of an environment (for a current frame)* with its claims 20 through 27, as follows:

- Wynn'394 reads on the feature of claim 4 for *determining an unfiltered probability of the environment based on the current noisy input feature vector* and the feature of claim 22 for *determining a probability of the environment for a current section* (claim 27 lines 36-38);
- Wynn'394 reads on the feature of claim 4 for *determining the probability of the environment based on at least one previous noisy input feature vector* and the feature of claim 22 for *determining the probability of the environment for a past section* (column 19 lines line 39);
- Wynn'394 reads on the feature of claim 4 for *applying weights to the probabilities to form weighted probabilities* and the feature of claim 22 for *weighting the probability for the current section to form a weighted current probability* (column 19 line 38); *and*
- Wynn'394 reads on the feature of claim 4 for *combining the weighted probabilities to determine the filtered probability of the environment for the current frame* and the

feature of claim 22 for *weighting the probability for the past section to form a weighted past probability* (column 19 lines 39-40 for column 19 lines 6-7).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Wynn'394 to the device/method of El-Maleh *et al* 6/99 to eliminate noise that cannot be directly measured without additional processing.

13. Regarding claim 5, the claim is set forth with the same limitations as claim 4. El-Maleh *et al* 6/99 is silent on the subject of *comparing probabilities.* Wynn'394 reads on the feature for *comparing the probability of each environment for the current frame* (the "old" and "new" of column 2 line 46-53) *and selecting the most probable environment as the identified noise environment* (the "minimum" of column 2 line 49-50).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Wynn'394 to the device/method of El-Maleh *et al* 6/99 to determine new environment noise models by repeatedly comparing the surrounding old/current results to minimize transition.

14. Regarding claims 6, 7, 23 and 24; the claims are set forth with the same limitations as claims 4, 3 and 22, respectively. El-Maleh *et al* 6/99 is silent as to the method of determining new environments although El-Maleh *et al* 3/99 introduces the requirement (4.2 in 3rd page).

- Wynn'394 reads on the feature of claim 24 for *determining a probability of the environment for a current section* (claim 27 lines 36-38);
- Wynn'394 reads on the feature of claims 6, 7, 23 and 24 of, *for each noise environment, counting the number of frames in a set of previous frames in which the noise environment had the highest filtered probability* (counting being required to *determine the number of noise frames* – see column 10 lines 19-24); *and*
- Wynn'394 reads on the feature claims 6, 7, 23 and 24, of *selecting the noise environment with the highest count as the identified noise environment for the current frame* (*selecting* being *establishing new noise frames* – see column 10 lines 2-4).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Wynn'394 to the device/method of El-Maleh *et al* 6/99 because testing for durability avoids overpopulating the number of environment "rules" with momentary "exceptions".

El-Maleh *et al* 6/99 & Liu

15. Claims 8-10, 12-13, 15, 25-26 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over El-Maleh *et al* 6/99 in view of Liu (U.S. Patent 5,680,508 A).

16. Regarding claims 8 and 25; the claims are set forth with the same limitations as claims 2 and 20, respectively. Where El-Maleh *et al* 3/99 teaches applications, El-Maleh *et al* 6/99 builds a codebook of environmental noise but does not apply differences. The

invention for Liu of a *low bit rate speech coding method for speech in noisy environment using LPC analysis* generates spectral parameters of speech frame that are matched against reference vocabulary vectors to select of optimal codeword associated with noisy environment, reading on the feature of the claim of *determining the distance between the input noisy feature vector and a codeword associated with the environment* (18 in figure 1 – see claim 12, column 14 lines 5-7). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Liu to the device/method of El-Maleh *et al* [6/99] to more properly remove noise from speech.

17. Regarding claim 9, the claim is set forth with the same limitations as claim 8. El-Maleh *et al* [6/99] is silent on using codeword vector distribution. Liu teaches the feature of *determining the distribution of a set of noisy training feature vectors associated with the codeword* (figures 9 & 10 – see column 8 lines 61-64 & column 9 lines 19-20). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Liu to the device/method of El-Maleh *et al* [6/99] to anticipate noise that can be expected from a known environment.

18. Regarding claims 10 and 26; the claims are set forth with the same limitations as claims 9 and 25, respectively. El-Maleh *et al* [6/99] teaches the feature where *the noisy*

training feature vectors are formed by modifying clean training feature vectors ("feature vector"→"noise class" in figure 1).

19. Regarding claims 12 and 28; the claims are set forth with the same limitations as claim 1. El-Maleh *et al* [6/99] *read* on the feature of claim 28 for *identifying frames of the noisy input signal* ("noise types" block in figure 1), generating noise parameters but does not reduce noise, while the related work of El-Maleh *et al* [3/99] to *modify processing according to the type of background noise requires noise classification done on a frame-by-frame basis* would apply classifications to eliminating signals but does not specify details.

Liu reads on the claim for *identifying a correction vector to apply to the noisy input feature vector to produce a clean feature vector based in part on the identified environment* ((16→17 in figure 1 – see column 3 lines 29-31).

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Liu to the device/method of El-Maleh *et al* [6/99] to make speech understandable over noises in the surroundings.

20. Regarding claims 13 and 29; the claims are set forth with the same limitations as claims 12 and 28, respectively.

El-Maleh *et al* [6/99] reads on the feature of claim 29 for *grouping a collection of noisy training feature vectors into mixture components* ("noise types" in figure 1) and *identifying a codeword for each mixture component* ("noise types"→"o" in figure 1).

El-Maleh *et al* [6/99] reads on the features of claims 13 and 29 for *determining which of a set of codewords associated with the identified environment is closest to the noisy input feature vector* ("z(n)" in figure 1)*; and selecting a correction vector associated with the closest codeword* (see the 2nd paragraph of section 3 on page 136).

21. Regarding claim 15, the claim is set forth with the same limitations as claim 12. El-Maleh *et al* [6/99] does not reduce noise. Liu reads on the feature where *the clean feature vector is a clean training feature vector* (claim 1 line 31). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Liu to the device/method of El-Maleh *et al* [6/99] to establish a pure baseline for detecting noises from the surroundings.

El-Maleh *et al* [6/99], Liu & Eberman *et al*

22. Claims 11, 27, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over El-Maleh *et al* [6/99] in view of Liu and further in view of Eberman *et al* (U.S. Patent 5,924,065 A).

23. Regarding claims 11 and 27; the claims are set forth with the same limitations as claims 10 and 26, respectively. El-Maleh *et al* [6/99] is silent on environmental codeword

vector measures. Liu teaches *adding additive noise feature vectors to the distorted training feature vectors to produce the noisy training feature vectors* (column 8 line 64) but does not mention *distortion.*

Addition for distortion is done in the invention of Eberman *et al* for *environmentally compensated speech processing* (125 in figure 1), reading on the feature of *convolving the clean training feature vectors with a set of channel distortion feature vectors to produce distorted training feature vectors* (124 & 121→126 – see column 5 lines 3-10)*; It* would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Eberman *et al* to the device/method of El-Maleh *et al* [6/99] to produce adjustments that can be used to correct the surrounding noises from speech.

24. Regarding claim 30; the claim is set forth with the same limitations as claim 28. Neither El-Maleh *et al* [6/99] nor Liu establish that clean vectors train models. Eberman *et al* teach the feature where *the clean feature vector is used to train a model* (column 9 lines 57-58). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Eberman *et al* to the device/method of El-Maleh *et al* [6/99] or Liu to provide a likely match against which to determine the probability of signals.

25. Regarding claim 31; the claim is set forth with the same limitations as claim 28. Neither El-Maleh *et al* [6/99] nor Liu establish that clean vectors train models. Eberman *et*

al teach the feature where *the clean feature vector is applied to a model to identify a speech unit* (column 1 lines 21-30). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Eberman *et al* to the device/method of El-Maleh *et al* [6/99] or Liu to provide a most likely match to determine the probability of signals.

El-Maleh *et al* [6/99], Liu & El-Maleh *et al* [3/99]

26. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over El-Maleh *et al* [6/99] in view of Liu and further in view of El-Maleh *et al* [3/99].

27. Regarding claim 16, the claim is set forth with the same limitations as claim 15. Neither El-Maleh *et al* [6/99] nor Liu mention *pattern recognition* while the prior work of El-Maleh *et al* [3/99] teach the feature where *the clean training feature vector is used to construct a model for pattern recognition* (last sentence of 1st paragraph of section 3 on 2nd page). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of El-Maleh *et al* [3/99] to the device/method of El-Maleh *et al* [6/99] or Liu to record surrounding noises for comparison.

El-Maleh *et al* [6/99] & Liu

28. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over El-Maleh *et al* [6/99] in view of Liu.

29. Regarding claim 17, the claim is set forth with the same limitations as claim 12. El-Maleh *et al* [6/99] does not manufacture *clean input.* Liu teaches the feature where *the clean feature vector is a clean input feature vector* (15→17 – see column 3 line 27).

El-Maleh *et al* [6/99], Liu & Takebayashi *et al*

30. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over El-Maleh *et al* [6/99] in view of Liu and further in view of Takebayashi *et al* (U.S. Patent 5,794,194 A).

31. Regarding claim 18, the claim is set forth with the same limitations as claim 17. Neither El-Maleh *et al* [6/99] nor Liu do pattern *recognition.* The invention of Takebayashi *et al* for *word spotting in a variable noise level environment* read on the feature where *the clean input feature vector is applied to a pattern recognition model to identify a pattern* (with the *robust input* 4 in figure 2 – corresponding to 15 of figure 1 in Liu – being matched in step D of figure 8, see column 9 lines 1-5). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Takebayashi *et al* to the device/method of El-Maleh *et al* [6/99] to preserve that bursts of loud speech that might otherwise be eliminated as noise.

El-Maleh *et al* [6/99] & Jiang *et al*

32. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over El-Maleh *et al* [6/99] in view of Jiang *et al* (U.S. Patent Publication 2002/0082829 A1).

33. Regarding claim 32, the claim is set forth with the same limitations as claim 19. Where El-Maleh *et al* [6/99] establishes *noise environments* (figure 1), they do not set a *confidence measure.* The invention of Jiang *et al* for *2-tier noise rejection in speech recognition* recognize the feature *for performing a step of setting a confidence measure based on the determination of the noise environment* (206 in figure 3 see ¶[0039] 1st sentence). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Jiang *et al* to the device/method of El-Maleh *et al* [6/99] to enhance the performance of recognition systems by detecting and rejecting noise using confidence measures.

Allowable Subject Matter

34. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

35. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

36. The following is a statement of reasons for the indication of allowable subject matter:

- The present invention is directed to categorizing the type of noise in speech signal processing.
- Claim 14 identifies the uniquely distinct feature of "dividing a feature vector space associated with the environment into sub-spaces ... using a set of boundary conditions; and comparing the noisy input feature vectors with at least some of the boundary conditions to identify the closest codeword in the environment."
- The closest prior art, Rees, discloses segmenting signal vectors by boundary but fails to anticipate or render the above underlined limitations obvious.

Conclusion

37. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- El-Maleh *et al* [3/99] ("Frame Level Noise Classification In Mobile Environments", International Conference on Acoustics, Speech, and Signal Processing, March 1999) modify processing according to the type of background noise requires noise classification done on a frame-by-frame basis.

- Asghar *et al* (U.S. Patent 6,009,391 A) line spectral frequencies and energy features in a robust signal recognition system associating codewords with noise.
- Thiemann *et al* ("Low Distortion Acoustic Noise Suppression Using A Perceptual Model For Speech Signals", IEEE Workshop Proceedings Speech Coding, October 2002) proposes a method for reduction in background noise in speech signals using a subtraction strategy & psychoacoustic model originally intended for audio signals.
- Berstein *et al* ("An Hypothesized Wiener Filtering Approach To Noisy Speech Recognition", International Conference on Acoustics, Speech, and Signal Processing, May 1991) when training a system in a clean environment and operating it in a noisy one, a correction process, based on a hypothesized clean template, is applied to the feature vectors of the noisy word.
- Hansen *et al* ("Constrained Iterative Speech Enhancement With Application To Automatic Speech Recognition", International Conference on Acoustics, Speech, and Signal Processing, April 1988) iterative speech enhancement apply inter- and intra-frame spectral constraints across all classes of speech on the basis of speech characteristics found during the enhancement procedure.
- Acero *et al* (European Patent 1199712 A) noise reduction method for use in pattern recognition system, involves adding correction vector to each scaled feature vector to obtain clean input signal having less noise.
- Suzuki (Japan Patent 09-258768) under-noise voice recognizing suppresses degradation of recognizing caused by the fluctuation of environmental noise and distance using a noise model and a noiseless voice model.

- Bloebaum *et al* (U.S. Patent 6,070,137 A) integrated frequency-domain voice coding using an adaptive spectral enhancement filter for current frames.
- Romesburg *et al* (U.S. Patent 6,163,608 A) for providing comfort noise in communications systems filters smoothes averaged frames.
- Downey (WO 9708684 A1) pattern recognition generates noise template/model.
- Rees (U.S. Patent 6,711,536 B2 & US Publication 2004/0158465 A1) speech processing selects noise models by frame.
- Gurbuz *et al* ("Multi-Stream Product Modal Audio-Visual Integration Strategy For Robust Adaptive Speech Recognition", International Conference on Acoustics, Speech, and Signal Processing, May 2002) present results for isolated word recognition for eight different noise types.
- Pastor *et al* (U.S. Patent 6,445,801 B1) frequency filtering applied to noise suppression in signals implementing a wiener filter.
- deVries (U.S. Patent 6,289,309 B1) noise spectrum tracking for speech enhancement.
- Hirani *et al* (U.S. Patent 5,892,853 A) for removing scratch or wire noise illustrative of applications other than speech that read on claims of application.
- Wynn'754 & Wynn'883 (U.S. Patent 5,708,754 & US 5,781,883) for real-time reduction of voice telecommunications noise not measurable at its source, teach that the best values depend on the noise class and speech type.
- Freeman *et al* ("The Voice Activity Detector For The Pan-European Digital Cellular Mobile Telephone Service", International Conference on Acoustics, Speech, and

Signal Processing, May 1989) the voice activity detector (VAD) standardized by CEPT for use in the Pan-European digital cellular mobile telephone service detecting speech in a noisy environment validate the design (because it uses the results of analysis performed in the speech coder) in difficult conditions.

- Treurniet ("Noise Independent Speech Recognition For A Variety Of Noise Types", International Conference on Acoustics, Speech, and Signal Processing, April 1994) input noise is recognized as a reference noise and that is used for the base transformation of the noisy utterance, teaching the features of claim 1 for *identifying a noise environment in which a noisy input signal was generated* are taught in sections 4.1, 4.2 and 4.3, respectively.
- Yang *et al* (U.S. Patent 5,432,859 A) noise-reduction system using filtered noise detection.
- McAulay *et al* ("Speech Enhancement Using A Soft-Decision Noise Suppression Filter", IEEE Transactions on Acoustics, Speech, and Signal Processing, April 1980) enhancing speech in an additive acoustic noise environment.

38. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel A. Nolan whose telephone number is (703)305-1368. The examiner can normally be reached on Mon, Tue, Thu & Fri, from 7 AM to 5 PM. If attempts to contact the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil, can be reached at (703)305-9645.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.The fax phone number for Technology Center 2600 is (703)872-9314. Label informal and draft communications as "DRAFT" or "PROPOSED", & designate formal communications as "EXPEDITED PROCEDURE". Formal response to this action may be faxed according to the above instructions,

or mailed to:

P.O. Box 1450
Alexandria, VA 22313-1450

or hand-deliver to: Crystal Park 2,
2121 Crystal Drive, Arlington, VA,
Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Technology Center 2600 Customer Service Office at telephone number (703) 306-0377.

Daniel A. Nolan
Examiner
Art Unit 2654

DAN/d
October 16, 2004

DANIEL NOLAN
PATENT EXAMINER